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TITLE OF THE INVENTION

SPORTS BOOT WITH FLEXIBLE FRAME

INVENTOR

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SPORTS BOOT WITH FLEXIBLE FRAME

BACKGROUND OF THE INVENTION

1. Field of the Invention

5 The present invention relates to a reinforcement system, a frame for a sports boot, especially gliding sports, of the flexible type such as a boot for snowboard, roller skate, in-line skate, ice skate, cross country ski boot, short ski, telemark, etc.

2. Description of Background and Relevant Information

10 Boots of the aforementioned type are adapted to ensure a linkage between the user's foot and the gliding apparatus, namely, a skate, snowboard, ski, etc., so as to enable the practice of the sport considered. In particular, they must be rigid enough to transmit the forces exerted by the user's leg to the gliding apparatus and/or to provide rigid supports in certain directions necessary for the practice of the sport, while being sufficiently flexible to allow certain flexional movements of the leg with respect to the foot and not to hinder certain movements in other directions.

15 In fact, the intention is to reconcile completely conflicting requirements, i.e., guaranteeing a certain comfort and a certain flexible retention of the foot and leg, and allowing them to take various positions as a function of the situations encountered or desired during the practice of the sport, on the one hand, and
20 guaranteeing, for the user's foot and leg, firm supports which must be especially

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powerful as the gliding apparatus (skate, ski, snowboard, etc.) is larger, or as the sport is often fast paced and/or involves more or less acrobatic movements.

Thus, the lever arms resulting from the dimensions of the sports apparatus induce forces on the foot or leg that are sometimes very substantial. Furthermore, the foot and/or leg also require to be retained forwardly and rearwardly, but also laterally and/or torsionally depending on the type of sport, these firm retention requirements being contradictory to the notion of comfort.

Similarly, in snowboarding, alpine skiing, or skating, a rearward leg support is generally sought, this support being more or less rigid depending on the sport that is practiced.

Historically, ski boots have evolved from relatively flexible structures (leather boots) to boots made of extremely rigid plastic materials. Snowboarding involves either boots with rigid structure borne of alpine technology, or supple boots of snow boots.

With respect to the supple or flexible boots, they generally ensure the foot retention by deformation of the upper (made of leather, fabric, flexible plastic), by bringing the latter closer to the foot/lower leg by means of a lacing system which tends to press the foot against the sole and rear of the boot.

It is also known from the document FR 2 902 735, for example, to have an external rigid frame arranged on the exterior of the boot and adapted to centralize the forces and supports during the practice of the sport. This external frame is generally made of a rigid rear stiffener affixed to a more or less rigid sole, and of

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a collar adapted to surround the lower leg and journalled on the rear stiffener. Such constructions are known especially in skates, as well as in snowboards. The journalled collar can be arranged on the inside or on the outside.

5 These constructions have made it possible to particularly improve the manufacture of flexible boots by combining the aspects of comfort, rigidity, and foot/leg retention.

However, they sometimes present problems of discomfort at the level of the journalled collar. Furthermore, the rigid materials that are used for the rigid portions tend to weigh down the boot.

SUMMARY OF THE INVENTION

10 An object of the present invention is to overcome the aforementioned disadvantages, and to provide a new flexible boot structure that is easy and inexpensive to implement, that allows a good transmission of the forces and supports, and that has appropriate rigidity along certain predetermined directions for the practice of the sport, while respecting the flexible structure of the boot to the maximum.

15 This object is achieved in the boot according to the invention, which is of the type having an outer sole and an external upper covering the foot and lower leg, in that the external upper has a flexible frame made out of a flexible, substantially non-stretchable material arranged along preferred directions of forces/supports affixed to both the upper and sole.

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Sub A1 Surprisingly, the linkage of the frame to the sole and upper makes it possible to notably reinforce the latter at the level of the frame, despite the flexibility of the frame, and to transmit the selected efforts/supports.

Furthermore, the choice of a flexible material allows an easy implementation on the upper.

Preferably, the assembly of the flexible material to the upper is done by stitching.

BRIEF DESCRIPTION OF DRAWINGS

The invention will be better understood and other characteristics thereof will become apparent from the following description, with reference to the annexed schematic drawing, in which:

FIG. 1 is a perspective view of a boot incorporating a flexible frame according to the invention;

FIG. 2 is a perspective view of a flexible frame, the boot being schematically shown in dotted lines;

FIG. 3 shows a flattened boot upper incorporating the flexible frame, before assembly;

FIG. 4 is a perspective bottom view showing the assembly of the flexible frame to the sole, with the upper not being shown;

FIG. 5 is a partial cross-sectional view along the line V-V of FIG.1;

FIG. 6 is a perspective view of a boot incorporating a flexible frame according to an alternative embodiment of the invention; and

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FIG. 7 is perspective view of a flexible frame according to the same alternative embodiment, the boot being schematically shown in dotted lines.

DETAILED DESCRIPTION OF THE INVENTION

5 FIG. 1 shows a boot, in this case a snowboard boot incorporating a flexible frame 10 according to the invention, shown in dotted lines in this figure. The application to a snowboard boot is only shown by way of a non-limiting example, and the invention can be used on any other sports boot, especially for gliding sports, such as a ski boot, cross country ski boot, skate boot, etc., in which similar or identical problems must be resolved.

10 The boot 1 has an external upper 2 adapted to cover the user's foot/leg and capable of being tightened on the user's foot/leg by a lacing 3 or any other closing means, and a bottom assembly or external sole 4.

It can also have an inner liner 5 depending on the type of boot.

15 A flexible frame 10, shown more particularly in FIGS. 2-4, is arranged within the external upper 2 and fixed to both the outer sole 4 and to the external upper 2, by an insole 7, as shown in FIG. 5, for example.

This flexible frame 10, constituted by a band-shaped material, has a dorsal portion 11 at the rear which extends substantially from the outer sole 4 up to the level of the top end of the upper, at about mid-height of the tibia.

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The dorsal portion 11 has, at its lower end 12, a flared portion adapted to surround the heel and ensure an efficient retention thereof.

This lower end 12 is furthermore provided with brackets 13 for its assembly to the outer sole 4.

5 Similarly, the upper end 14 of the dorsal portion 11 is flared so as to allow a covering of the calf and a better support distribution.

The upper end 14 of the dorsal portion 11 is connected on each side to the outer sole 4 by a lateral arm 15 substantially in the form of a C in this case.

10 Furthermore, each lateral arm 15 is provided with a vertical connecting lug 16 adapted to ensure its linkage with the outer sole 4.

Preferably, the linkage of the vertical lug 16 with the outer sole 4 occurs substantially at the level of the foot metatarsophalangeal joint for an optimum transmission of the forces that are generated during practice.

15 Depending on the type of sport that is practiced, this linkage can be arranged at the front or rear of the metatarsophalangeal joint.

Finally, each lateral arm 15 is connected to the dorsal portion 11 in the area of the flexion fold and in the area of the upper end 14, respectively, of the dorsal portion 11, by a connecting lug 17, oriented substantially along the flexion fold, and a second connecting lug 18.

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Each of the portions 11, 15, 17, 18, of the flexible frame 10 is made of a flexible, substantially non-stretchable material, i.e., a material that is substantially non-stretchable for the normal values of forces applied during the practice of the sport considered. In practice, materials such as polyvinyl chloride, polyamide, polyethylene, or polyurethane can be used.

Preferably, although not necessarily, the frame 10 has an integral or a unitary, one-piece structure.

The flexible frame 10 is fixed to the external upper 2 and to the outer sole 4 in two ways.

Initially, it is affixed to the upper 2 by various seams, or stitchings, 20, 21, respectively.

The seams 20 constitute the assembly of each edge of the dorsal portion 11 to the external upper 2, whereas the seams 21 constitute the assembly of each of the connecting lugs 16, 17, 18 of each lateral arm 15 to the upper, thereby preserving a possibility of longitudinal mobility of the lateral arms 15 with respect to the external upper 2.

These seams 20, 21 can be triple, as shown in the figures, or single, double, etc.

Sub A 2) The seams 21 can be merged with the continuous seams 22 of the upper for aesthetic reasons. The assembly of the lower ends of the frame to the upper can

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be made by a low peripheral seam 24, as shown in FIG. 3, and/or by means of the insole 7 on which these ends 13, 16 are fixed by adhesion and/or nails 24. 11

Surprisingly, and despite the flexibility of the material used for the flexible frame 10, the linkage thereof with the upper and the outer sole contributes to the stiffening of the upper, the transmission of the forces, and a certain energizing of the upper in forward bending.

Indeed, the dorsal portion 11, combined with the lateral arms, makes it possible to provide a rear support, due to the non-stretchability of the material used.

Likewise, the non-stretchability of the material and the relative freedom of the lateral arms 15, in conjunction with their C-shape, make it possible to ensure an elastic rearward return of the upper following a forward bending. Additionally, the lateral arms 15 offer a certain resistance to forward bending, and therefore a certain rigidity due to the fact that this flexional force occurs along a zone of great moment of inertia of the lateral arms. Other forms or arrangements of the lateral arms can be provided to provide a maximum moment of inertia with respect to the directions of the forces applied, for which rigidity is desired.

Finally, the assembly of the lateral arms to the sole in the area of the metatarsophalangeal joint allows a transmission of the forces along a preferred metatarsophalangeal joints/leg direction.

FIG. 6 shows a snowboard boot that incorporates a flexible frame 10 according to an alternative embodiment, and is shown in dotted lines in this figure.

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The intrinsic characteristics of the flexible frame 10, as well as the modes for attaching the frame 10 to the external upper 2 and on the outer sole 4, which have been described previously, also apply to this alternative embodiment.

5 This alternative embodiment is distinguished mainly by the singular geometry of the reinforcement which is the object of the present description, and by the specific tightening means. Indeed, the lateral arm 15 of the flexible frame 10 has a tightening means 31, such as guides or keepers for the lace. Moreover, the dorsal portion 11 has, at least laterally, a lug 32 having tightening means 33 which, in this case, are hooks for the passage of the lace 3. This lug 32 is located on a level with the top of the external upper 2, above the ankle joint. The dorsal portion 11 can advantageously have two lugs 32, 32a, which are substantially symmetrical.

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20 The general tightening arrangement, composed of the lace 3, can advantageously pass in guides 102, 103, 31, 33, respectively, located alternately on the external upper 2 and on the flexible frame 10. This constructive arrangement makes it possible to combine a powerful tightening in the area of the guides 31, located on the lateral arm 15 for the instep girth, and in the area of the guides 33 located on the lug 32 for the tibia, and to combine a substantial tightening at the level of the guide 102, located on the external upper 2 for the ankle, and in the area of the guide 103 for the toes.

The alternating of the guides or keepers of the lace that are positioned on the external upper 2 and on the flexible frame 10 can be different from the arrangement described.

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5 In most sports, especially snowboarding, where flexible boots are used, it is necessary to maintain a good rear support on the boot. To achieve this object, the flexible frame 10 is constituted of at least two pieces which overlap one another in the area of the calf, thus creating an overlap 104. This specific assembly is shown in FIG. 7. The dorsal portion 11 has a first rear piece 110. Additionally, a front piece 111 has at least one lug 32 or at least one lateral band 15. This front piece 111 has appropriate fixing means 112, such as seams which make it possible to fix the front piece 111 on the rear piece 110, in the area of the dorsal portion 11. *dm*

10 The rear piece 110 can advantageously be made of a slightly less flexible material than the front piece 111, so as to better transmit the rear supports on the gliding apparatus. Additionally, the great flexibility of the front piece 111 makes it possible to properly cover the foot while retaining it laterally. The lateral band 15 can be advantageously connected, at least on the inner side, to the dorsal portion 11 of the front piece 111 by appropriate means, such as seams. The lateral band 15 can be made of a more flexible material than the front piece 111, for example, a more flexible plastic material or a non-stretchable textile strap. Respecting this constructive arrangement makes it possible to improve the internal lateral bending of the boot, which can be useful in snowboarding. *dm*

20 The flexible frame 10 can be made integral or in one-piece. In this case, the objects related to rear support and internal lateral bending, which have been previously described, are achieved by variations in the thickness of the flexible frame 10 and/or by hot forming processes which make it possible to obtain stiffening ribs in the flexible frame 10.

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5 The dorsal portion 11 can advantageously include a substantially vertical notch 113 located substantially in an axial plane of the boot. This notch 113, located on a level with the top of the external upper 2, makes the rear support more comfortable by locally softening the top of the external upper 2, at the level of the calf. Moreover, the dorsal portion 11 can advantageously include a recess 30 at the level of the front portion of the heel of the foot. The dorsal portion 11 is then connected to the outer sole 4 by at least one band 120 that extends laterally in the vicinity of the ankle. This recess 30 makes it possible to clear a space for the heel, and thus to better adapt the dorsal portion 11 to the morphology of the rear portion of the user's foot. This recess 30 can be advantageously completed by a notch 134 whose lower end opens out on the recess 30. It allows the dorsal portion 11 to adapt perfectly, because the notch 134, which is arranged substantially vertical and arranged substantially along the axial plane of the boot, conforms to the geometry of the Achilles tendon of the user's foot.

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15 In the same preferred embodiment shown in FIG. 7, the dorsal portion 11 includes the recess 30. The fixing means 112, which make it possible to fix the two constituent pieces 110, 111 of the flexible frame 10 to one another, are then positioned above the recess 30.

20 The flexible frame 10 can be asymmetrical and only have one lateral arm 15 and/or one lug 32. In this case, guides of the lace will be arranged on the external upper 2 in order to reconstitute the symmetry in the lacing area.

For snowboarding, and especially for jumps, the following geometry can be advantageously retained: two symmetrical arms 15, one lug 32 on the lateral side, i.e., on the external side, and a band 120 on the same side. Respecting this

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arrangement facilitates the lateral bending on the internal side of the boot, while stiffening the lateral bending on the external side and maintaining a good rear support.

5 In all of the described embodiments, the flexible frame 10 can be arranged on the outside as well as on the inside of the external upper 2.

The shape and construction of the flexible frame can also be modified depending on the intended sport. Thus, if essentially asymmetrical forces are to be transmitted, the frame will have a corresponding asymmetrical shape, and will possibly have only one lateral arm.

10 The particular ease of use of such a flexible frame is also noted, since the use of a flexible, although substantially non-stretchable material allows a very easy implementation by a mere seam or adhesive.

The present invention is not limited to the described embodiments and encompasses all of the similar or equivalent embodiments.

15 Moreover, the invention is not limited to the described embodiments but applies also to any boot in which similar or equivalent problems must be solved.

20 The instant application is based upon French Patent Application No. 99.04297, filed March 30, 1999, the disclosure of which is hereby incorporated by reference thereto in its entirety, and the priority of which is hereby claimed under 35 U.S.C. §119.